**Fig. 1**

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Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Eu	Fe	Gd	In	Ir	La	Mn	Ni	ReO	Rh	Ru	TiO	Yb	Zn	Avg TON
0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1802
1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1711
1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1698
0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1671
1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1670
0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1645
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1645
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1645
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1645
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1645
0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1623
0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1621
1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1614
0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1578
1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1550
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1539
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1530
0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1521
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1516
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1509
0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1506

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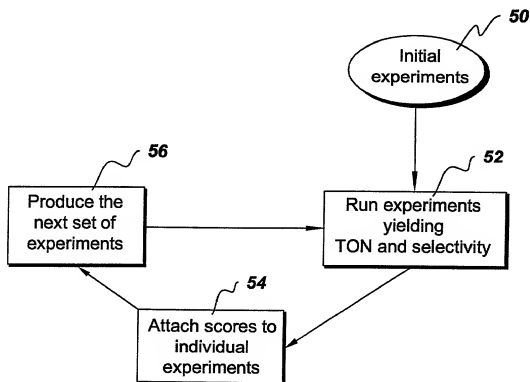
Fig. 2

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Metal	Electro-negativity	Atomic Radius	Covalent Radius	Ionization Potential	Atomic Ionization Potential				Electron Affinity
					I	II	III	IV	
Bi	1.67	1.7	1.46	7.29	7.29	16.16	25.56	45.3	0.95
Ca	1.04	1.97	1.74	6.11	6.11	11.9	50.908	67.1	0.18
Cd	1.46	1.54	1.48	9	8.99	16.91	37.48	NA	NA
Ce	1.06	1.81	1.65	5.53	5.47	10.85	20.2	36.72	NA
Co	1.7	1.3	NA	7.87	7.86	17.06	33.5	51.3	0.662
Cr	1.56	1.27	NA	6.76	6.76	16.5	30.96	49.1	0.666
Cs	0.86	2.67	2.25	3.89	3.89	25.1	NA	NA	0.47
Cu	1.75	1.28	1.38	7.73	7.726	20.29	36.83	55.2	1.235
Eu	1.01	2.04	1.85	5.68	5.67	11.25	24.9	NA	NA
Fe	1.64	0.68	0.72	7.9	7.87	16.18	30.65	54.8	0.151
Ga	1.82	1.4	1.26	6	6	20.51	30.71	64	0.3
In	1.49	1.66	1.44	5.79	5.78	18.87	28.03	54	0.3
Ir	1.55	1.36	NA	9	9.1	NA	NA	NA	1.565
La	1.08	1.86	1.69	5.61	5.57	11.06	19.1	NA	NA
Mn	1.6	1.26	NA	7.43	7.43	15.64	33.66	51.2	NA
Ni	1.75	1.24	NA	7.63	7.63	18.17	35.17	54.9	1.156
Pb	1.55	1.75	1.47	7.417	7.416	15.032	31.94	42.32	NA
Re	1.46	1.37	NA	7.87	7.9	NA	NA	NA	0.15
Rh	1.45	1.34	NA	7.46	7.46	18.08	31.06	NA	1.137
Ru	1.42	1.33	NA	7.37	7.37	16.76	28.47	NA	1.05
Sb	1.82	1.5	1.38	8.641	8.64	16.53	25.3	44.2	NA
Sn	1.72	1.5	1.41	7.344	7.34	14.63	30.5	40.7	NA
Ti	1.32	1.45	1.36	6.82	6.82	13.58	27.49	43.26	0.079
Yb	1.06	1.93	1.7	6.22	6.25	12.17	25	NA	0.5
Zn	1.66	1.38	1.31	9.39	9.394	17.964	39.722	59.4	NA
Zr	1.22	1.6	1.48	6.835	6.84	13.13	22.99	34.34	NA

Fig. 3

***Fig. 4***

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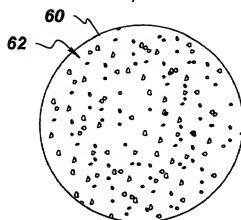


Fig. 5

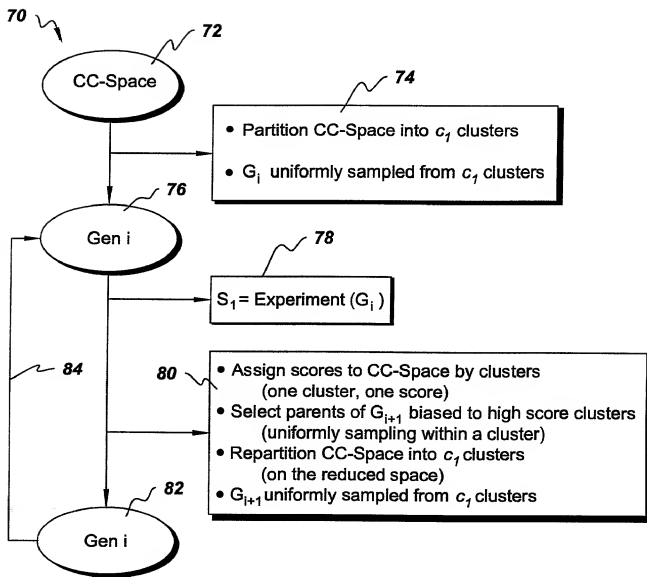
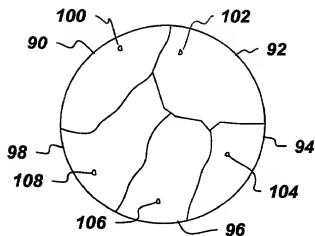
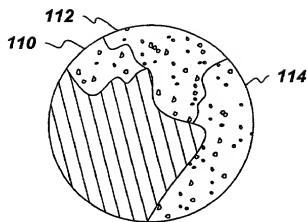
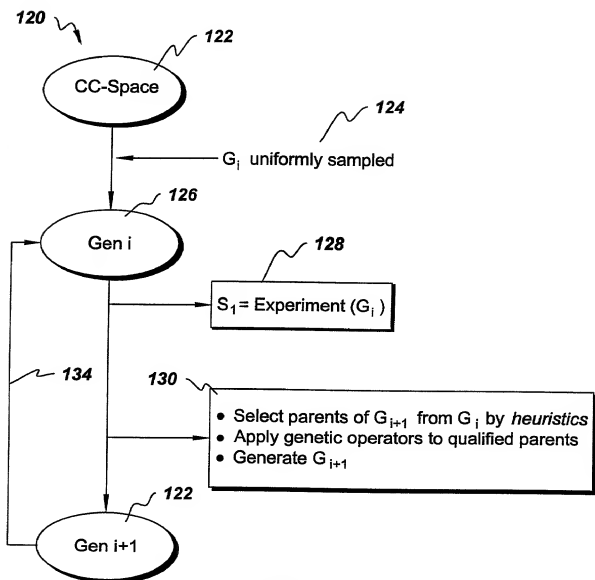
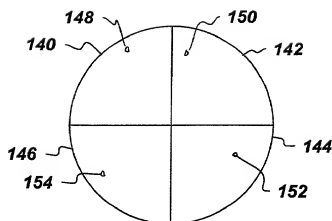


Fig. 6

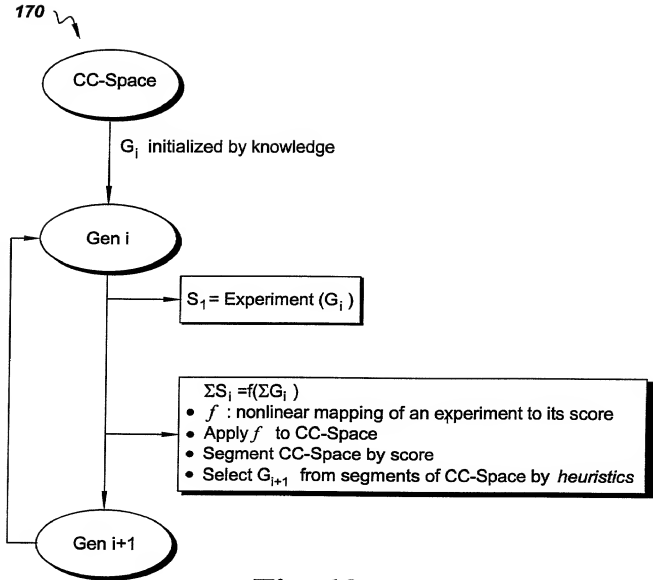
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**Fig. 7****Fig. 8****Fig. 9**

**Fig. 10**

160							162		164	
166										
exp 1	Ca	Cu	Fe	• • • • •	Rh	Yb				
exp 2	Cd	Eu	Fe	• • • • •	Yb	Zn				
exp 3	Gd	Ir	La	• • • • •	Ni	Ru				
•	•	•	•		•	•				
•	•	•	•		•	•				
•	•	•	•		•	•				
•	•	•	•		•	•				

Fig. 11

**Fig. 12**